

**Nitrate Mitigation in the Suwannee River Basin: Utilizing Perennial Forage Species
(Phase I-Perennial C-4 Grasses)
FDACS#9685**

Final Report
To Florida Department Agriculture and Consumer Services
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Equipment Acquisitions:

Equipment was purchased in support of forage BMP development work. Both plot-scale and field-scale equipment were required to support the work.

Equipment	Cost
Giddings hydraulic soil coring machine	\$24718
2 Mower/vacuum systems	\$6620
10 Drain Gauges	\$11824
Flail chopper	\$8250
Clipper	\$1856
Carter forage seeder	\$20800
Germinator	\$1658
Field Supplies	
Other Requirements	
OPS labor	\$1795
Total	\$75726

BMP development progress:

1. Field Preparations

Four varieties of Bermudagrass were sprigged in the spring, 2005 at approximately 1.5 acres per variety. These plantings are establishing well. The shielded sprayer has helped maintain clean buffers between varieties. Three varieties of bahiagrass were seeded in the summer, 2005 at approximately 2 acres per variety. Establishment was slow. Some reseeding may be required in spring, 2006, along with seeding of the new bahiagrass line developed by Dr. Blount. Smaller plots of bahiagrass were seeded in Live Oak and Marianna. Establishment failed at Live Oak. These will be reseeded in spring 2006.

2. Bahiagrass rooting study

A study was initiated to determine if small (1.5" dia.) columns can be used to quickly screen bahiagrass lines for rooting mass in the field. More robust rooting lines should be better at capturing nitrates and other nutrients before they leach beyond the root zone. Clear acrylic columns (2 inch x 4 ft and 4 inch x 3 ft) were filled with soil from Live Oak in three layers to mimic the depth differences of undisturbed soil (Fig. 1). In addition, a low bulk density soilless mix was also compared. The bulk densities for the three layers from surface to 3 feet were 1.55, 1.49, and 1.59 g cm⁻³, respectively. The bulk density of the soilless mix was 0.77 g cm⁻³.

Apomictic bahiagrass varieties Argentine and Tifton-7 were seeded in 11 replicated 4" columns and 24 replicated 1.5" columns. Both Argentine and Tifton 7 bahiagrass varieties are noted for their large root systems but the Tifton 7 appears to have a much larger root system than Argentine or other Pensacola-derived varieties, i.e., Tifton-9. Field plots at Live Oak were seeded at the same time so that plant roots could be harvested in situ at the termination of the column study. This would help determine if the columns (large or small) adequately assessed rooting potential in the field. Seed germination failed in both the field plots and the columns. The study will be reinitiated in spring, 2006.



Figure 1. Soil column study (3 soil layers in a 4" column) prior to seeding.

3. Seed increases

The bahiagrass seed increase focuses on new diploid and tetraploid germplasm.

Diploid photoperiod and cold adapted (PCA) populations FL PCA Cycle 3 and FL PCA Cycle 4 were selected for early spring, late fall forage growth, and improved rooting structure. These cycles have been grown, alternating between Marianna and Ona FL, selecting over wide environments to improve cold tolerance and photoperiod response. In addition to those physiological traits, progress has been made in selecting for resistance to the dollar spot fungus, increasing rooting/stolon mass, and selecting for more rapid germination of the seed. FL PCA Cycle 3 and FL PCA Cycle 4 are currently in trials at the Range Cattle Research and Education Center at Ona, the Coastal Plain Experiment Station at Tifton, at the North Florida Research and Education Center at Marianna, the Agronomy Forage Research Unit at the Dairy Research Unit, Hague, FL, and is also being evaluated at Mississippi State University for cold tolerance. Breeder's seed increases of FL PCA Cycle 3 and FL PCA Cycle 4 Forage were planted at two locations in Florida in 2003 and acreage was increased at both locations in 2005.

Tetraploid or 'Argentine-type' bahiagrass evaluations and seed increases are also underway. Tetraploids tend to be very robust plants that germinate quickly and spread rapidly to cover new land within the first year of establishment. Breeding improvement has been limited with 'Argentine' and 'Paraguay 22' due to the chromosome number and type of reproduction (apomixis) in the plant. We recently imported new germplasm from Argentina to use in our tetraploid crossing program. In addition, to the new acquisitions, we have been able to successfully use chemicals on 'Tifton 9' (a diploid type) to create new tetraploid lines. These lines are being crossed with the new materials from Argentina, and several other tetraploid types that have desirable features for use as a utility turf or forage. Experimental lines are being evaluated at the Agronomy Forage Research Unit at the Dairy Research Unit and we anticipate that several genotypes will be selected for evaluation for this specific project

Field Days and Workshops:

Twilight Field Day, NFREC-Suwannee Valley, 24 May, 2005

Forage Workers Tour (State-wide), NFREC-Suwannee Valley, 10 August, 2005

Vegetable and Agronomic Crop BMP Manual in-service training, Suwannee River Water Management District, Live Oak, 28 September, 2005

Fall Forage Production Meeting, A.W. Gaylord Farm, O'Brien, 11 October, 2005

Fall Workshop, NFREC-Suwannee Valley, 9 November, 2005